

One-Way Wrench

Field of Invention

The present invention relates to a one-way wrench.

Background of Invention

Referring to Figure 11, a conventional one-way wrench 80 includes a head 81 defining a circular space 82, a crescent space 83 communicated with the circular space 82 and a hole 86 communicated with the crescent space 83, an annular gear 84 rotationally put in the circular space 82, a pawl 85 movably put in the crescent space 83 for releasable engagement with the annular gear 84 and a spring 87 including an end put in the hole 86 and an opposite end connected with the pawl 85. The spring 87 is compressed between a wall of the crescent space 83 and the pawl 85 for biasing the pawl 85 into engagement with the annular gear 84. The spring 87 is essential for adequate operation of the pawl 85 and hence the entire one-way wrench 80. However, the spring 87 is vulnerable to excessive deformation. Therefore, adequate operation of the one-way wrench 80 could be jeopardized.

The present invention is therefore intended to obviate or at least alleviate the problems encountered in prior art.

Summary of Invention

It is the primary objective of the present invention to provide a one-way wrench that ensures adequate operation.

1 According to the present invention, a one-way wrench includes a head,
2 biasing means, a pawl and a gear. The head defines a circular space, a
3 crescent space communicated with the circular space and a hole
4 communicated with the crescent space. The biasing means includes a
5 first spring and a weaker and longer second spring. The springs both
6 include a first end put in the hole and a second end put in the crescent
7 space. The pawl is movably put in the crescent space and includes an
8 end abutted against the second end of the second spring and a toothed
9 side. The gear is rotationally put in the circular space and includes a
10 toothed periphery for engagement with the toothed side of the pawl.

11
12 Other objects, advantages and novel features of the invention will become
13 more apparent from the following detailed description in conjunction
14 with the attached drawings.

15 16 **Brief Description of Drawings**

17 The present invention will be described via detailed illustration of
18 embodiments referring to the drawings.

19
20 Figure 1 is a perspective view of a one-way wrench according to a first
21 embodiment of the present invention.

22
23 Figure 2 is an exploded view of the one-way wrench of Figure 1.

24
25 Figures 3-5 are cross-sectional views of the one-way wrench of Figure 1
26 and show the one-way wrench ready for driving a fastener in a direction

1 and not in an opposite direction.

2

3 Figure 6 is a perspective view of a one-way wrench according to a second
4 embodiment of the present invention.

5

6 Figure 7 is an exploded view of the one-way wrench of Figure 6.

7

8 Figure 8 is a cross-sectional view of a second type of biasing means used
9 in the one-way wrench according to the present invention.

10

11 Figure 9 is a cross-sectional view of a third type of biasing means used in
12 the one-way wrench according to the present invention.

13

14 Figure 10 is a cross-sectional view of a fourth type of biasing means used
15 in the one-way wrench according to the present invention.

16

17 Figure 11 is a cross-sectional view of a conventional one-way wrench.

18

19 **Detailed Description of Embodiments**

20 Referring to Figures 1 and 2, according to a first embodiment of the
21 present invention, a one-way wrench 10 includes a head 11, a handle (not
22 numbered) extending from the head 11, an annular gear 40, a pawl 30,
23 biasing means 20, an O-ring 50 and a C-ring 51.

24

25 The head 11 defines a circular space 12, a crescent space 13
26 communicated with the circular space 12 and a hole 14 communicated

1 with the crescent space 13. An annular edge 15 is formed on a wall of
2 the circular space 12. A groove 16 is defined in the wall of the circular
3 space 12.

4
5 The biasing means 20 includes a first spring 21 and a second spring 22
6 put in the first spring 21. The springs 21 and 22 both include a first end
7 put in the hole 14 and a second end put in the crescent space 13. The
8 first spring 21 is stronger and shorter than the second spring 22.

9
10 The pawl 30 is movably put in the crescent space 13. The pawl 30
11 includes a stud 32 formed on an end thereof, a smooth side 34 and a
12 toothed side 36. The stud 32 is put in the second spring 22.

13
14 The annular gear 40 is rotationally put in the circular space 12. The
15 annular gear 40 is supported on the annular edge 15. The annular gear
16 40 includes a toothed external side 42 for engagement with the toothed
17 side 36 of the pawl 30 and a toothed internal side 41 for engagement with
18 a fastener (not shown).

19
20 The O-ring 50 is put in the circular space 12 and supported on the annular
21 gear 40. The O-ring 50 includes a groove 52 defined in an external side
22 thereof.

23
24 The C-ring 51 includes an internal edge put in the groove 52 of the O-ring
25 50 and an external edge put in the groove 16 of the head 11 so as to hold
26 the O-ring 50 to the head 11. Thus, the annular gear 40, the pawl 30 and

1 the biasing means 20 are held to the head 11.

2
3 The biasing means 20, the second spring 22 to be specific, is compressed
4 between a wall of the crescent space 13 and the pawl 30 for biasing the
5 pawl 30 against the annular gear 40. Thus, the toothed side 36 of the
6 pawl 30 is brought into engagement with the toothed external side 42 of
7 the annular gear 40.

8
9 Referring to Figure 3, the head 11 is rotated clockwise relative to a
10 fastener (not shown) engaged with the annular gear 40. The fastener
11 holds the annular gear 40 in position. The annular gear 40 holds the
12 pawl 30 in position. As a result, the second spring 22 is further
13 compressed so as to allow disengagement of the pawl 30 from the annular
14 gear 40. Thus, the fastener remains un-rotated.

15
16 Referring to Figure 4, the head 11 is rotated counterclockwise relative to
17 the fastener. The wall of the crescent space 13 pushes the pawl 30 by
18 the smooth side 34. The pawl 30 rotates the annular gear 40. The
19 annular gear 40 rotates the fastener.

20
21 Referring to Figure 5, if the toothed side 36 of the pawl 30 accidentally
22 sticks to the toothed external side 42 of the annular gear, the head 11
23 rotates the fastener clockwise. The second spring 22 is further
24 compressed. The second spring 22 is protected from excessive
25 deformation by means of the first spring 21. Then, the first spring 21 is
26 compressed. The springs 21 and work together so as to forcefully

1 disengage the pawl 30 from the annular gear 40. After that, the head 11
2 no longer rotates the fastener clockwise.

3
4 Figures 6 and 7 show a one-way wrench according to a second
5 embodiment of the present invention. The second embodiment is
6 identical to the first embodiment except for including a gear 60 instead of
7 the annular gear 40. The gear 60 includes a cylinder 62 for insertion
8 into a socket (not shown). A detent 64 is attached to the cylinder 62 for
9 contact with an internal wall of the socket. A quick-release device 63 is
10 installed at the cylinder 62 in order to control the detent 64.

11
12 Figure 9 shows another type of biasing means 74. The biasing means 74
13 includes a first spring 75 and a second spring 76 in which the first spring
14 75 is put. The springs 75 and 76 both include an end put in the hole 14
15 and a second end put in the crescent space 13. The first spring 75 is
16 stronger and shorter than the second spring 76. The second spring 76 is
17 protected from excessive deformation by means of the first spring 75.

18
19 Referring to Figure 8, another type of biasing means 70 is shown. The
20 biasing means 70 includes a first spring 71, a second spring 72 and a joint
21 73 connecting the first spring 71 with the second spring 72. The first
22 spring 71 includes a first end put in the hole 14 and a second end put in
23 the crescent space 13. The second spring 72 includes a first end and a
24 second end in which the stud 32 is put. The joint 73 includes a first end
25 put in the second end of the first spring 71 and a second end put in the
26 first end of the second spring 72. The first spring 71 is stronger than the

1 second spring 72. As being shorter, the second spring 72 is less
2 vulnerable to excessive deformation than the spring 87 of the one-way
3 wrench 80 discussed in the *Summary of Invention*. As being stronger
4 than the second spring 72, the first spring 71 is even less vulnerable to
5 excessive deformation than the spring 87 of the conventional one-way
6 wrench 80 discussed in the *Summary of Invention*.

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8 Referring to Figure 10, another type of biasing means 77 is shown. The
9 biasing means 70 includes a spring 78 and a sleeve 79 in which the spring
10 78 is put. The spring 78 and the sleeve 79 both include an end put in the
11 hole 14 and a second end put in the crescent space 13. The stub 32 is
12 put in the second end of the spring 78. The spring 78 is protected from
13 excessive deformation by means of the sleeve 79.

14

15 The present invention has been described via detailed illustration of some
16 embodiments. Those skilled in the art can derive variations from the
17 embodiments without departing from the scope of the present invention.
18 Therefore, the embodiments shall not limit the scope of the present
19 invention defined in the claims.

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